Space Weather Forecast

Issued on Thursday, 23 May 2024 at 13:03 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Minor Radio Blackouts (R1) Likely at times throughout. Slight chance Minor Geomagnetic Storm (G1), peaking Saturday 25 May. Up to two potential CMEs awaiting imagery for assessment.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Activity has been Moderate, with occasional Moderate-class flares observed. All of these emanated from a large and complex sunspot group in the southwest, peaking with an impulsive mid-ranking Moderate X-ray flare at 23/0216UTC.

The above sunspot group is one of up to six sunspot regions on the current facing side, with a seveth having become indistinct on the southwestern solar horizon in the 24 hours as a further small region appeared in the northwest. Changes in the visible sunspot groups were generally small in the period, however the main exception was in the aforementioned large southwestern region, which saw emergence and spreading of new central penumbral spots. There is also a potentially noteworthy large group near the middle of the Sun, however changes here were minor and generally in small movements of peripheral spots.

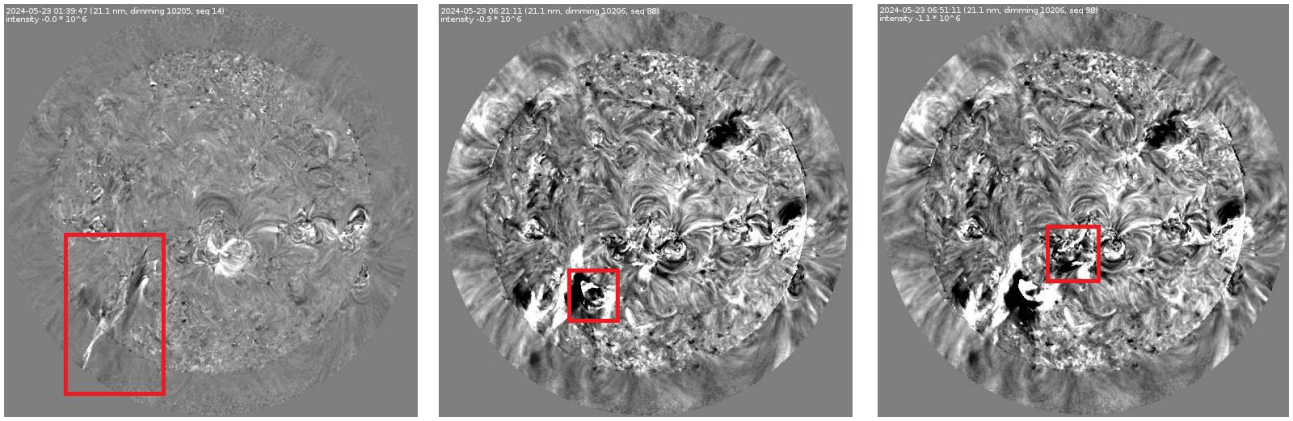

Figure 1: SIDC ROB-processed time-integrated ‘coronal dimmings’ (dark regions on these images, often footprints of CMEs). Shown are three possible CME-generating events of note in the past 24 hours, with each event shown boxed in red at 23/0140UTC, 23/0600UTC and 23/0630UTC. Only the first of these has been assessed fully at the time of writing (as a miss).

The period has been notably active in terms of Coronal Mass Ejections (CMEs). At the time of writing, the main CMEs of note include a very large partial 'filament lift off' near 30 East, peaking around 23/0100UTC. This event may have helped trigger a second event near S25E020 around 23/0600UTC, which in turn may have been the catalyst to trigger a more central filament eruption at 23/0630UTC. The lift-off locations are progressively more noteworthy from this trio, getting nearer and nearer the (potentially) more Earth-directed middle portion of the Sun with each event.

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However, satellite imagery is not yet available in sufficient quantity/quality to assess anything other than the initial 23/0100UTC filament, with this determined to miss, crossing behind and below the track of the Earth's orbit late on 26 May. The later two CMEs are therefore pending assessment.

Solar Wind / Geomagnetic Activity: Solar winds have been indicative of ongoing slow wind conditions. The solar wind speed showed a slow upward trend in the 24 hours within background levels. The number of particles in the solar wind near-Earth and their associated magnetic field were both unremarkable, helping lead to provisionally Quiet geomagnetic indices throughout.

Energetic Particles / Solar Radiation: No solar radiation storms were observed, despite several large potentially generative X-ray flares in the 24 hours.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate activity is likely to continue, with isolated Moderate-class flares possible each day, and a slight chance of rising to High due to any Strong-class flares. These are most likely from the sunspot in the southwest. Two large sunspot groups are due to return over the coming UTC weekend (although notably not the Extreme geomagnetic storm producing region, with this due into the new UTC working week). It is uncertain how much of these regions have survived their transit across the far-side, and the overall risk is gradually downward over the four-day period as a result (up to and including the UTC weekend).

Solar Wind / Geomagnetic Activity: At the time of writing there are no Earth-directed CMEs expected, with up to two awaiting imagery (discussed in Solar Activity section).

Slightly elevated solar winds are expected to persist today and tomorrow (23-24 May), before the onset of any fast wind enhancement. The strength and timing of this enhancement is low confidence, but there is perhaps a peak risk of a slight chance of Minor Geomagnetic Storm G1, perhaps most likely Saturday 25 May, with activity otherwise starting and ending the four days quiet (barring any new CMEs).

Energetic Particles / Solar Radiation: High energy proton flux carries a daily slight chance of enhancement should any upper-end Moderate or Strong flares materialise. This may begin to very gradually reduce later in the UTC weekend as the larger spot groups recede.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	5	10	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

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X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	Yes	70	60	55	50
Very Active	R3 to R5 X	No	10	5	5	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	20	20	20	15
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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